

Fibreoptic bronchoscopy in smear-negative pulmonary tuberculosis

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ABSTRACT: Fifty smear-negative pulmonary tuberculosis patients underwent fibreoptic bronchoscopy. Bronchial aspirate smears of twelve patients and post-bronchoscopic sputum smears of fourteen patients were positive for acid-fast bacilli (AFB). Bronchial biopsy provided the diagnosis in 9 out of 30 patients. Brush smears were positive in 28 patients, being the only positive sample in ten cases. A high yield from brush smears was obtained due to their preparation from caseous material wherever visible in the bronchi. With these results a rapid diagnosis was established in 36 of the 50 patients. When culture results were available, a definite diagnosis of tuberculosis was made in 45 of the patients. The yield from brush smears was found to be significantly better when compared to bronchial aspirate smears ($p < 0.01$) and post-bronchoscopic sputum smears ($p < 0.01$).

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Sputum examination has been the most useful method of diagnosing active pulmonary tuberculosis. However, about half the patients suspected of having active disease are unable to produce sputum. Even if sputum is available, acid-fast bacilli (AFB) may not be found on repeated examination of direct smears [1]. If these patients were left untreated, 64% of them would require chemotherapy within twelve months [1].

The fibreoptic bronchoscope is useful for obtaining lower respiratory tract secretions and lung tissue with little risk. Its value in reaching an early bacteriological diagnosis of tuberculosis in sputum smear-negative patients has been demonstrated with varying results [2-6]. We report an analysis of 50 sputum smear-negative patients of pulmonary tuberculosis subjected to fibreoptic bronchoscopy.

Patients and methods

Fifty patients aged 22-65 yrs, suspected clinically and radiologically of having active pulmonary tuberculosis and with sputum smear-negative for AFB on three or more occasions or who were unable to produce sputum, were subjected to fibreoptic bronchoscopy. Radiologically, 35 patients had minimal and 15 moderately advanced disease.

Transnasal bronchoscopy was performed on all patients using the Olympus BF-P10 scope after premedication with atropine sulphate, 0.6 mg intramuscularly. Since lignocaine may inhibit mycobacterial growth the total dose instilled was limited to 4 ml of 4% and 4 ml of 2% solution [7]. Disposable brushes were used to make brush

smears from the involved segments prior to taking bronchial aspirates and biopsy. Smears were also made from the white cheesy material when it was visible. Bronchial aspirates were then collected after wedging the bronchoscope and instilling 20 ml normal saline into each involved segment and a bronchial biopsy was taken last. Sputum was collected for 72 h following bronchoscopy.

All specimens were stained with Ziehl-Neelsen stain. Pre- and postbronchoscopic sputum and bronchial aspirates were also cultured after concentration on Löwenstein-Jensen medium. A biopsy result was regarded as positive only when granulomata were seen.

The chi-squared test was employed for statistical analysis.

Results

The results have been summarized in table 1. Endo-bronchial lesions (localized hyperaemic and swollen mucosa, stenosis of segments or plaques of caseous material) were seen in twenty of the fifty patients and the rest had a normal bronchial tree.

Direct smear and histological examination

Positive smears for AFB were obtained in 28 brushings, 12 bronchial aspirates and 14 postbronchoscopic sputum samples. Bronchial biopsy showed granulomatous inflammation in 9 out of 30 patients. By combining these results an early diagnosis was made in 36

patients. The direct smear of bronchial aspirates provided the only positive sample in three patients, as did the postbronchoscopic sputum smear in two and the brush smear in ten patients. Bronchial biopsy alone provided the diagnosis in 3 out of 30 patients.

Table 1. — Diagnostic yield of fibreoptic bronchoscopy in 50 smear-negative pulmonary tuberculosis patients

Specimen	No. of patients positive for AFB	
	Total	Those negative by all other specimens
Brush smear	28	10
Aspirate smear	12	3
Postbronchoscopic sputum smear	14	2
Biopsy histopathology*	9	3
Aspirate culture	20	2
Postbronchoscopic sputum culture	20	3

*: n=30; AFB: acid-fast bacilli.

Culture

Prebronchoscopy sputum culture was positive in 20 out of 30 patients, bronchial aspirate culture in 20 and postbronchoscopic sputum culture in 20 patients also. Bronchial aspirate, prebronchoscopic sputum and postbronchoscopic sputum cultures were the only positive samples in two out of 50, 4 out of 30 and 3 out of 50 patients, respectively.

When all results were combined, a definite bacteriological diagnosis was made in 45 patients. The diagnosis in the remaining five patients was made on the basis of the clinical response to treatment. Brush smears added significantly to the yield of AFB when compared to bronchial aspirate smears ($p < 0.01$) and postbronchoscopic sputum smears ($p < 0.01$).

Discussion

The diagnosis of sputum smear-negative patients suspected of having active pulmonary tuberculosis presents a difficult clinical problem to the chest physician. Gastric lavage has been found to be clinically unreliable due to 33% false positives [8]. Specimens collected by trans-tracheal aspiration have little benefit over expectorated sputum in the yield of AFB [9].

Some previous studies of fibreoptic bronchoscopy have demonstrated *Mycobacterium tuberculosis* in only 0.8–2.1% of cases [6, 10, 11]. With such poor results it was suggested that the procedure was not cost-effective. However, these studies had included a wide variety of cases. Careful selection of patients and a high index of suspicion are necessary to improve the yield. Routine smear and culture of bronchoscopic specimens would be an unnecessary load on the microbiology laboratory.

Fibreoptic bronchoscopy provided an immediate diagnosis in 72% of our patients. Other comparable series have demonstrated a rapid diagnosis of tuberculosis in 34–73% of cases [2–6]. When compared to the series of DANEK and BOWER [3], there is little difference in our smear results of bronchial aspirates, postbronchoscopic sputum and biopsy histopathology. The higher yield of positive brush smears (56%, only positive sample in 20%) has largely contributed to a better immediate diagnosis in our study. The contribution of brush smears towards an early diagnosis has been underemphasized by various workers. It has even been suggested that this sample can be eliminated from the evaluation without loss of diagnostic yield [4, 5]. In contrast, other investigations [2, 12] including our own results show it to be a useful ancillary procedure making a significant contribution to the overall diagnosis of pulmonary tuberculosis. Brush smears should be made prior to taking bronchial aspirates and succour should be avoided. Brushings give excellent results if they are made exclusively from the white, cheesy secretions seen in the bronchi of patients with pulmonary tuberculosis.

A definite diagnosis of pulmonary tuberculosis was made in 45 of our 50 patients, which is comparable with other series. The relative importance of smear and culture examination of all specimens is underlined by the exclusive positivity of each sample in some patients.

To conclude, bronchial sampling can improve the diagnosis of pulmonary tuberculosis. Brush smears should be made in all cases in addition to smear examination of bronchial aspirates and postbronchoscopic sputum. In the future, other promising methods such as DNA hybridization [13] may contribute to rapid detection and species identification of mycobacteria.

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RÉSUMÉ: Cinquante patients atteints d'une tuberculose pulmonaire négative à l'examen direct, ont subi une fibroscopie bronchique. Les étalements d'aspiration bronchique ont été positifs pour les bacilles acido-résistants dans 12 cas, et les frottis d'expectoration post-bronchoscopique dans 14 cas. La biopsie bronchique a fourni un diagnostic chez 9 des 30 patients. Les étalements de brossage furent positifs chez 28 patients, et furent les seuls à être positifs chez 10 patients. Le taux élevé de rendement des étalements de brosse a été obtenu grâce à leur préparation à partir de matériel caséux quant il était visible au niveau bronchique. Grâce à la fibroscopie, un diagnostic rapide a été établi chez 36 des 50 patients. Une fois connus les résultats des cultures, un diagnostic formel de tuberculose a été porté chez 45 d'entre eux. La rentabilité des brossages bronchiques s'avère significativement meilleure par comparaison avec les étalements d'aspiration bronchique ($p < 0.01$) et des étalements de crachats post-bronchoscopiques ($p < 0.01$).